

Title:

**Environmental Assessment for Coiled-Tubing
Drilling Experiment at San Ysidro, New Mexico,
BLM Rio Puerco Resource Management Area**

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Prepared for: **U.S. Department of Interior, Bureau of Land
Management, Albuquerque District Office**

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ACRONYMS AND TERMS

| | | | |
|-----------------------|--|--------------|--|
| <i>ACEC</i> | <i>areas of critical environmental concern</i> | <i>NEPA</i> | <i>National Environmental Policy Act</i> |
| | | <i>NM</i> | <i>New Mexico</i> |
| <i>BLM</i> | <i>Bureau of Land Management</i> | <i>NMED</i> | <i>New Mexico Environment Division</i> |
| <i>yd³</i> | <i>cubic yards</i> | <i>NPDES</i> | <i>National Pollutant Discharge Elimination System</i> |
| <i>EA</i> | <i>environmental assessment</i> | | |
| <i>EPA</i> | <i>Environmental Protection Agency</i> | <i>PPE</i> | <i>personnel protective equipment</i> |
| <i>ft</i> | <i>feet</i> | <i>psi</i> | <i>pounds per square inch</i> |
| <i>in.</i> | <i>inches</i> | <i>PVC</i> | <i>polyvinyl chloride</i> |
| <i>km</i> | <i>kilometers</i> | <i>RCRA</i> | <i>Resource Conservation and Recovery Act</i> |
| <i>LANL</i> | <i>Los Alamos National Laboratory</i> | | |
| <i>lb</i> | <i>pounds</i> | <i>SW</i> | <i>southwest</i> |
| <i>mi</i> | <i>miles</i> | <i>TSCA</i> | <i>Toxic Substances Control Act</i> |
| <i>MSDS</i> | <i>material safety data sheets</i> | <i>U.S.</i> | <i>United States</i> |
| <i>N</i> | <i>north</i> | <i>USGS</i> | <i>United States Geological Survey</i> |
| <i>NAAQS</i> | <i>National Ambient Air Quality Standards</i> | <i>UTM</i> | <i>Universal Transverse Mercator</i> |
| | | <i>W</i> | <i>west</i> |

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1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to refine microdrilling and miniaturized seismic/down-hole instrument technologies for characterizing geologic formations that may be favorable hosts of economic resources. The United States Department of the Interior, Bureau of Land Management (BLM) has a need to make federal lands available for various research and development activities including the area of subsurface and economic geology. The objective of the Proposed Action is to improve microdrilling technology, develop and test miniaturized down-hole instrumentation, and demonstrate "proof-of-principle" of the new technology in an appropriate geologic setting.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

The Proposed Action would be to drill one 800 to 850-ft hole (using microdrilling technology) as vertical as feasible with the possibility of drilling a second hole vertically to the same depth and in the same area. The primary objective would be to create a test hole for the demonstration and evaluation of a 7/8-in.-diameter, multi-level, 3-axis seismic array. The duration of the drilling work is estimated to be less than 1 month and the seismic array evaluation could last up to two years. Once the downhole seismic experiments are complete, the conductor pipe and liner would be cut off below surface and the liner filled with cement. The hole would then be plugged to surface with cement or bentonite grout. Abandonment could be accomplished in one day. The Proposed Action would be in conformance with the BLM Rio Puerco Resource Management Plan approved in November 1986 (maintained and reprinted October 1992). All onsite work would be performed by University of California employees from Los Alamos National Laboratory (LANL) or their contractors.

Operations would begin with an auger drilled hole, (dry—5 1/2-in. diameter) where a pipe of approximately 3-in. diameter is lowered in and cemented in place (conductor pipe.) The conductor pipe for this particular experiment would be 100 ft in depth. This would greatly reduce the chance of washout around the outside of the conductor pipe. Once the conductor is in place, a control head would be threaded onto the top of the conductor. This would allow the coiled tubing to be pulled in and out of the borehole while still maintaining control of the drilling fluids. Coiled-tubing drilling operations would involve the drilling of a 2 3/8-in. diameter borehole, using a rock bit and downhole motor which is attached to a spool of tubing. The tubing is literally pushed into the earth by use of an "injector" at the surface. Fluids would be pumped through the tubing which turns the motor and thus the bit. Fluids then exit the bit and carry the cuttings out of the borehole on the outside of the tubing (annulus). Cuttings would be removed from the fluid and the fluid would be re-circulated. The drilling fluids returning up the annulus would exit the control head through a side-port and hose and be returned back to the mud system. The fluid would then be pumped over shaker screens and through hydro-cyclones which remove cuttings, sands and silts from the fluid. Bentonite would be mixed with water to achieve a drilling mud that more easily carries cuttings uphole and provides stability of the walls of the borehole. Once the desired depth is reached, the tubing, motor and bit would be removed from the borehole. A liner, (1 1/4-in. diameter PVC flush joint pipe) would then be lowered into the borehole and hung slightly off bottom. Portland cement would then be pumped down the liner and allowed to flow up the annulus to surface. A wiper-plug, (or dart) would then be pumped down the liner, using

fresh water. The wiper-plug would lock in place near the bottom, and clear the cement from the inside of the liner, leaving it full of fresh water. The water could later be removed from the liner with compressed air injected through a capillary tube, lowered into the liner. Cuttings and drilling fluid would be left on site in a 18- to 24-in. \times 8-ft trench. The volumes of cuttings and drilling mud should be less than 1.50 yd³. The cuttings from the upper 100 ft would be augered out dry and should total about 0.50 yd³. The volume of cuttings from the lower 750 ft of 2 $\frac{3}{8}$ -in.-diameter hole should amount to about 0.85 yd³. The drilling muds are non-hazardous and environmentally benign. Any water pumped from the hole(s) would also be contained within the trench with the cuttings and drilling muds.

The area selected for drilling has previously been heavily disturbed during the construction of a water storage tank. There is currently minimal vegetation in the area of impact. Reclamation would consist of re-leveling the area and scattering appropriate seed mixes. A small earth mover (a Bobcat) would be used to dig a shallow settling pit for discharged drilling fluid and cuttings containment and for site reclamation. The dirt road to the site is soft and could become rutted during rainy periods. The Bobcat would also be used to keep the road passable.

Once the hole(s) are drilled, miniature seismic instruments would be lowered into the hole(s) to evaluate their performance. Seismic waves would then be generated by one of two methods (A and/or B). Method "A" would involve the use of a Vibraseis truck. The truck would be set up on the right of way of highway 44 just below the drill site. LANL personnel have received written permission from the New Mexico State Highway Department to use the Vibraseis truck along Highway 44. Method "B" would involve repeatedly dropping a 750-lb block of cement from a height of 8 ft onto the ground within the drill site.

LANL personnel would be required to secure a BLM land use permit. Approximate start date for the Proposed Action is late June 2001. Drilling operations could last up to one month. Seismic testing could last up to two years. Sealing and abandonment of the drill holes could be accomplished within one week. All work would be performed during daylight hours and would not exceed 12 hours per day, including travel time. The drilling crew would be on site daily for one to two weeks to drill the holes. LANL personnel would visit the site periodically (on average, one day per week). Less than 10 workers would be involved with the proposed project at any one time. The site is secured by a chained and locked gate. Access would be restricted to the LANL crew (3 to 4 people), BLM staff, and the San Ysidro Municipal Water System staff. The well heads would be capped with pipe plugs when not being used for seismic testing. Portable generators would be used to provide electrical service.

Equipment that would be brought in for the Proposed Action includes: coiled-tubing unit, mud system, air compressor, auger drilling unit, data acquisition truck, pipe trailer, the Bobcat on a trailer, and water truck. An alternative drilling mud additive is sometimes used and is a water-soluble polymer emulsion, (organic) which is commonly used in the drilling of drinking water wells. If extremely hard rock layers are encountered, a downhole percussion hammer would need to be rented and used to break up the rock layers.

2.2 No Action Alternative

If the BLM decides not to permit the Proposed Action, then the San Ysidro site would remain in its current condition. The development of this new drilling/seismic technology would either be delayed or not developed.

3.0 SITE DESCRIPTION AND ENVIRONMENTAL IMPACTS

3.1 Site Description and Regional Setting

The proposed drilling site is approximately 1 mi SW of San Ysidro, New Mexico, roughly 100 ft higher in elevation than the townsite, on the north side of State Road 44, just off the west access road to the San Ysidro municipal water system's storage tank (Figure 1). The approximate location is latitude 35° 33' 37.6" N, longitude 106° 47' 25.1" W (UTM - 337740, 3936474).

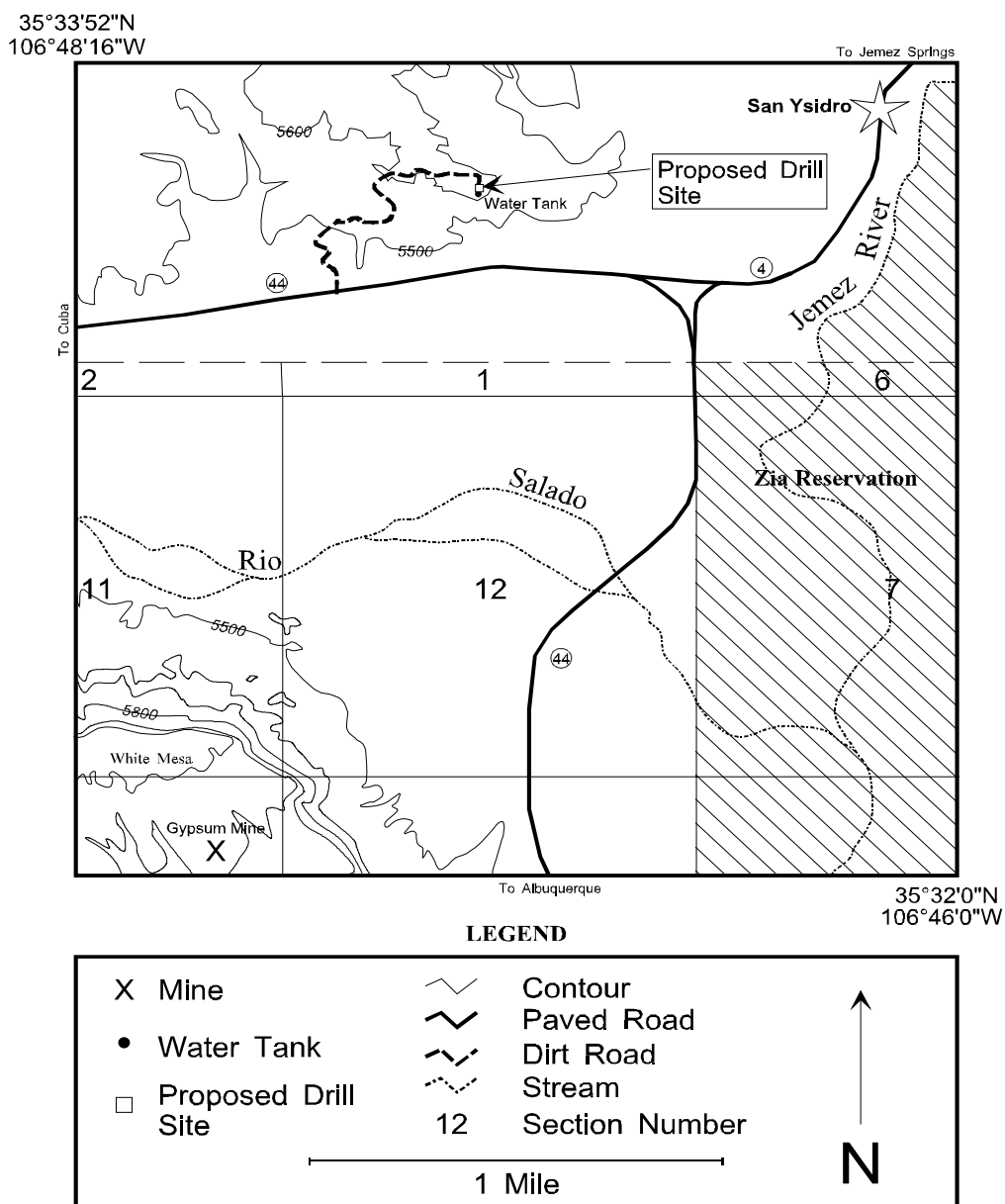


Figure 1. Location map of proposed drill site derived from the United States Geological Survey (USGS) San Ysidro 7.5-minute Quadrangle.

The site is located on Federal land managed by the BLM for multi-purpose use. Currently, the site is heavily disturbed from construction of a water tank and a dirt road that provides access to the water tank. There is minimal vegetation at the proposed drilling site. Surrounding the water tank and drilling site are stands of Piñon/Juniper (Figure 2).

Also in the immediate area, approximately 1 to 2 mi south of the proposed drilling site, on top of the mesa, is a large gypsum mine operated by American Gypsum. The mining operation is administered by the BLM. At the foot of the same mesa is a private site used for the sorting of pumice mined in the Jemez mountains and operated by Copar Mining Company. The proposed drilling action is thus consistent with current uses of land within the immediate area. In addition, the Proposed Action is in conformance with the BLM Rio Puerco Resource Management Plan approved in November 1986 (maintained and reprinted October 1992).



Figure 2. Proposed drilling site next to San Ysidro Municipal Water tank (looking south). White rectangle delineates a roughly 60 x 60 ft area within which the Proposed Action would take place.

3.2 Impacts of the Proposed Action

Potential environmental issues associated with the Proposed Action are listed in Table 1. Environmental issues that were considered but not analyzed further are listed in Table 2. Both Tables 1 and 2 were developed in consultation with BLM staff.

Table 1. Potential Environmental Issues

| Environmental Category | Described in Section |
|----------------------------------|-----------------------------|
| <i>Air Quality</i> | 3.2.1 |
| <i>Water Quality</i> | 3.2.2 |
| <i>Worker Health and Safety</i> | 3.2.3 |
| <i>Wildlife</i> | 3.2.4 |
| <i>Hazardous or Solid Wastes</i> | 3.2.5 |

Applicability determined in consultation with BLM staff.

Table 2. Environmental Issues Considered but not Analyzed Further

| Environmental Category | Rationale for Non-Applicability |
|---|--|
| <i>Socioeconomics</i> | The proposed activity would be performed by fewer than 10 persons, periodically, over a period of less than or equal to 2 years. Because of the short timeframe and low number of workers, the effect on the socioeconomic character of the surrounding community would be negligible. |
| <i>Cultural Resources</i> | The microborehole is proposed to be drilled in an area previously disturbed for installation of the water tank. A cultural resources inventory [NM-017-98(III)E] completed at that time reported no cultural resources in the area of impact. The Proposed Action would be restricted to the previously disturbed area and would result in no impacts to cultural resources. |
| <i>Native American Religious Concerns</i> | A letter was sent by BLM to the affected Tribes and no comments were received. Thus, no concerns are known to exist at the proposed site. |
| <i>Farm Lands</i> | There are no farm lands within the area of impact. |
| <i>Floodplains</i> | The site does not occupy a floodplain and is situated on a bench approximately 100 ft above the local land level. |
| <i>Areas of Critical Environmental Concern (ACEC)</i> | The proposed drill site is not within an ACEC. |
| <i>Threatened or Endangered Species</i> | There are no known threatened or endangered species in the area of impact. The Proposed Action would have no effect on any Federally listed threatened or endangered species. |
| <i>Wetlands/Riparian Zones</i> | The Proposed Action would not affect any local wetlands or riparian zones. |
| <i>Wild and Scenic Rivers</i> | This site does not contain, nor is it adjacent to, any Wild or Scenic Rivers. |

Table 2. Continued

| Environmental Category | Rationale for Non-Applicability |
|------------------------------------|---|
| <i>Wilderness</i> | This site is not contained within any declared wilderness. |
| <i>Invasive, Nonnative Species</i> | The Proposed Action would not introduce any nonnative or invasive species. |
| <i>Environmental Justice</i> | Populations that are subject to Environmental Justice considerations are present within 50 mi (80 km) of San Ysidro, NM (near the intersection of Highway 44 and State Road 4). However, this project is not anticipated to result in significant environmental impacts, therefore there are no disproportionately high and adverse human health or environmental effects on minority and low-income populations. |

Non-Applicability determined in consultation with BLM staff.

3.2.1 Air Quality

Activities would temporarily increase localized particulate (e.g., dust) and certain other criteria pollutants (e.g., vehicle emissions), but the amount of pollutants is expected to be minimal and temporary in nature. The National Ambient Air Quality Standards (NAAQS) of the Clean Air Act for non radioactive air emissions are regulated by the State of New Mexico for the U.S. Environmental Protection Agency (EPA). No requirements under the air quality regulations have been identified for the activities or the equipment described within this environmental assessment (Hurtle 2001). Sample drilling for site characterization is exempt (Section 202 A.7.) from permitting under 20 NMAC 2.72. This type of exemption does not require notification to the New Mexico Environment Division (NMED). The equipment that is being used to support the drilling activities is also considered exempt.

3.2.2 Water Quality

It is expected that the drilling operation may intersect two water tables. Previous drilling at another site located nearby and 100 ft lower in elevation intersected two aquifers. Chemical analysis performed on the water produced from the upper aquifer and on the combined water produced from both aquifers revealed that the water quality is poor and the two aquifers have very similar chemistry (Thomson 2001). The aquifers would be isolated when the 1¼-in. PVC casing is cemented in, eliminating any possibility of cross-contamination. The casing would be filled with cement when the Proposed Action is completed. Additionally, all materials used in the drilling operation are consistent with those used in the production of drinking water wells thus, no adverse impacts to ground water are expected.

There are no surface water features at the site. Construction sites of less than 5 acres do not require National Pollutant Discharge Elimination System (NPDES) permits or the implementation of a pollution prevention plan. However, best management practices would be required at the drill site to reduce the potential for surface water run-off and soil erosion. This would include containment of drilling fluids, cuttings, and any water pumped from the drill holes (in a shallow trench) as well as re-leveling the site once the project is completed.

3.2.3 Worker Health and Safety

Workers may be exposed to hazards such as noise, heat, high pressure systems, pinch points, rigging, lightning, travel, tripping, fatigue, lifting, electric generators, fuels (diesel, gasoline), other fluids (hydraulic fluid), and environmental hazards such as snakes and insects. Workers would use proper personnel protective equipment (PPE) when warranted; including, but not limited to: ear plugs, hard hats, gloves, and steel-toed boots. All work would be performed in accordance with a Hazard Control Plan (LANL document) written and evaluated specifically for this Proposed Action. Work will occur during daylight hours only and the duration would be less than 12 hours per day (including travel time). Therefore, no adverse health and safety effects on workers are expected.

3.2.4 Wildlife

The main impact to local wildlife would be from noise generated from the equipment and the generation of seismic waves. The effects would disturb/displace animals temporarily. Most larger, mobile animals would either acclimate or temporarily leave; returning when the Proposed Action is complete. Since the area of the drill site has been previously disturbed and would be re-leveled and re-seeded when the Proposed Action is complete, it is anticipated that the Proposed Action would cause only temporary adverse effects to the local wildlife or the environment.

3.2.5 Hazardous or Solid Wastes

The drilling muds to be used are commercially available muds manufactured by the Baroid Co. of Houston, Texas. The drilling fluids would consist of a mixture of water, MUD GEL[®], and EZ-MUD[®]. MUD GEL[®] is a natural bentonite clay. EZ-MUD[®] is a copolymer emulsion. Material Safety Data Sheets (MSDS) for both products indicate that they are non-hazardous and do not decompose into hazardous substances. A review of Federal and State regulations (Horst 2001) indicate that neither of these materials nor their additives would cause any waste generated (drilling fluids) to be considered either a Resource Conservation and Recovery Act or Toxic Substances Control Act waste.

The formation to be drilled is the Petrified Forest Member of the Chinle Formation. This rock unit is exposed to the surface all along the south side of the bench upon which the drilling site is located, below a layer of sandstone. The formation consists of reddish-orange and brownish-maroon clay and shale and some soft green shale. The calculated volume of cuttings to be dry augered for the surface casing is about 0.50 yd³. The volume of cuttings to be microdrilled from the lower 750 ft of a 2³/₈-in.-diameter hole amounts to about 0.85 yd³ for a total cuttings volume of less than 1.50 yd³. Based on the type of drilling muds to be used and the nature of the cuttings, leaving these materials on site in a shallow trench that is later covered would not pose any environmental impacts.

The possibility exists that oil, hydraulic fluid, grease, and/or gasoline/diesel could leak from the trucks and other equipment. All vehicles and equipment are to be inspected for leaks prior to arrival at the proposed drill site. In addition, personnel would pack out all trash generated (paper, rags with grease or diesel fuel, PPE, etc.).

3.3 Impacts of No Action Alternative

Since the alternative is to disallow the Proposed Action, there are no environmental impacts for the alternative. New drilling/seismic technology would either be delayed or not developed.

3.4 Mitigation Measures and Residual Impacts

Once the downhole seismic experiments are concluded, the liner would be filled with cement from total depth to surface. The conductor pipe and liner would be cut off below surface and the hole would then be filled to the surface with cement. The containment trench would be backfilled, the entire drilling site re-leveled, and the area would be seeded with an appropriate seed mixture. No residual impacts are expected as the hole(s) would be cemented and the site would be left in essentially the same condition as prior to the Proposed Action.

4.0 DIRECT, INDIRECT, AND CUMULATIVE IMPACTS ON THE ENVIRONMENT

Direct impacts could occur to air and/or water quality, worker health and safety, and wildlife. Waste could also possibly have a direct impact on the proposed site. However, all of these issues are discussed in Section 3.0 of this Environmental Assessment with the conclusion being that only minor or temporary adverse environmental effects may occur. No indirect impacts are expected from the Proposed Action. A cumulative impact may occur, at least temporarily, due to the presence of an operating gypsum mine located approximately 1 to 2 mi south of the drilling site. However, since the Proposed Action is relatively short term and is consistent with the current use of the area, cumulative impacts are expected to be minor.

5.0 PERSONS OR AGENCIES CONSULTED

Consulted: Kent Hamilton, NEPA Coordinator, BLM, Albuquerque, NM
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